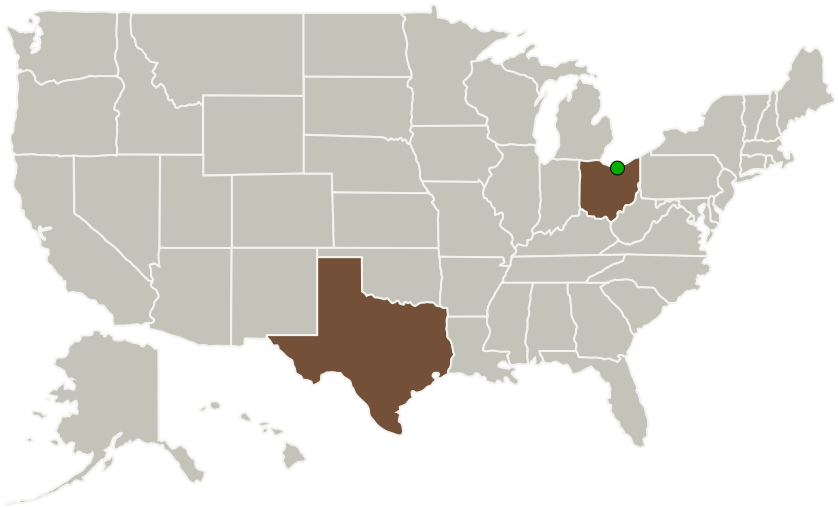
Controlled Canfield Joint as Improved Gimbal for Flywheel Systems, Phase I

Completed Technology Project (2012 - 2013)

Project Introduction

Balcones Technologies, LLC proposes to adapt technologies developed by and resident in The University of Texas at Austin Center for Electromechanics (CEM) in the areas of dynamically controlled precision actuators and flywheel energy storage systems to address STTR 2011-1 Subtopic T3.01, Technologies for Space Power and Propulsion. In particular, our team will develop a concept design for a replacement to traditional flywheel gimbal systems that is based on a parallel kinematic structure proposed by Dr. Canfield in approximately 1997 as a carpal wrist joint, now commonly known as the Canfield Joint. The intended result will be a concept for an actively controlled Canfield-Joint Gimbal Replacement System (CGRS) that is considerably less expensive, simpler, and more reliable than current gimbal technology; does not require slip rings for power and control cables; does not have singularity issues, such as gimbal lock; and has relatively simple controls based on analytical kinematic solutions. Our proposed Phase I project will fully evaluate requirements, develop appropriate simulations of the kinematics and control system for a flywheel with magnetic bearings in the CGRS, develop a concept design of the CGRS, develop a commercialization and production plan, and develop a Phase II program plan to demonstrate the system with an existing high-speed flywheel system on magnetic bearings.

Primary U.S. Work Locations and Key Partners



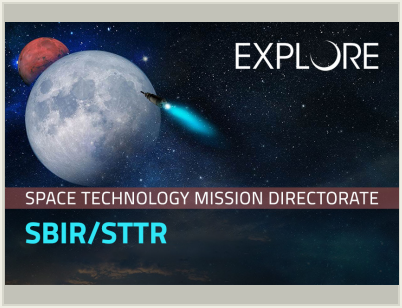


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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Completed Technology Project (2012 - 2013)

Organizations Performing Work	Role	Type	Location
Balcones Technologies, LLC	Lead Organization	Industry	Austin, Texas
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
University of Texas - Center for Electromechanics	Supporting Organization	Academia	Austin, Texas

Primary U.S. Work Locations	
Ohio	Texas

Project Transitions

February 2012: Project Start

February 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140690)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Balcones Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

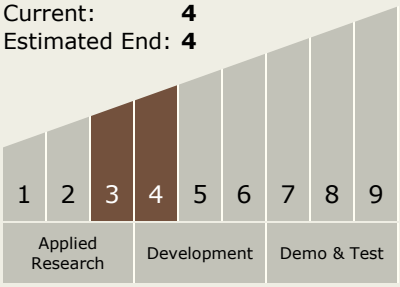
Carlos Torrez

Principal Investigator:

Joseph H Beno

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Completed Technology Project (2012 - 2013)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.3 Advanced Concepts for Energy Storage

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System